Wealth effect in the US: evidence from brand new micro-data

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Abstract

This article investigates how wealth and capital gains affected household consumption in the USA in the period 1989-2004. The empirical evidence brought so far by the literature is unclear, likely because of the low quality of the data more readily available. We combine information from the Consumer Expenditure Survey and the Survey of Consumer Finances to perform a detailed analysis on the effects of wealth on consumption. We divide between durables and non durables consumption, and we also investigate the roles of the different components of household wealth, both gross and net. Our cross-section estimates indicate that there is a significant tangible wealth effect, and its economic importance lies in the low range of the estimates of the previous empirical literature. On the contrary, financial wealth seems to have no significant effects on consumption, apart from a low positive effect during the Nineties. The estimation of the model with a Pooled OLS on the repeated cross sections confirms these initial findings. Interesting features arise from the estimation of the model dividing the sample by income quartiles, such as a decreasing wealth effect as income rises. Overall, our results demonstrate that the fears of sizable reverse direct wealth effects due to sudden declines in housing values has been overstated in previous studies.

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1. Introduction

During the Nineties and the beginning of the new Millennium, a period of growing stock and housing prices, the US aggregate savings rate fell considerably, leading to a renewed interest in the understanding of its determinants. In particular, the recent literature concentrated on the effects of household wealth on household consumption and savings, through the so called 'wealth effect' channel. This new wave of studies aimed at understanding the possible role of wealth in exacerbating the effects of a slowdown of the economy in case of constant or declining share and housing prices (Paiella, 2007a). With the subprime mortgages crisis of 2007 and the following financial and economic crisis, this scenario, from mere hypothesis, has become reality. In light of that, the aim of our article is to explore deeply the role of household wealth on consumption and, consequently, on savings.

Greenspan (2003) credited housing wealth, realized capital gains, and home equity borrowing with shoring up the economy in the aftermath of the stock market collapse of 2000 and the recession of 2001, primarily through their effects on consumer spending. However, the mechanism through which wealth directly affects consumption is not yet clearly understood: while the arguments supporting a direct wealth effect are clear (changes in wealth directly cause changes in consumption through their effect on households' contemporaneous budget sets), the empirical evidence brought so far by a large literature that investigates the role of wealth shocks on consumption is unclear. Moreover, wealth can affect consumption through the indirect channel of providing a collateral for obtaining access to credit (Cynamon and Fazzari, 2008). Some authors claim that the decline in the personal saving rate (that, in most developed countries, started in the middle of the Eighties) is largely due to the significant capital gains in corporate equities experienced over this period (Juster et al., 2005). Others conclude that there is at best a weak evidence of a stock market wealth effect, and underline the importance of housing wealth in determining the households decisions on consumption and savings (Case et al., 2005).

In our article we investigate the role of wealth and capital gains on household consumption in the period 1989-2004 using a household-level dataset specifically built for this purpose, since no single existing survey contains detailed data both on consumption and wealth. Thus, we combine information from two different surveys: the Consumer Expenditure Survey (CES) and the Survey of Consumer Finances (SCF). Essentially, we impute the SCF wealth variables to the CES households (that is, we use the SCF as a donor to enrich the variables set of the CES) in order to estimate a consumption equation with wealth, in various decompositions, as one of the main explanatory variables. To the best of our knowledge, a similar procedure has been exploited only once

previously for similar purposes, by Bostic et al. (2009). However, we improve the matching methodology implemented by Bostic et al. (2009) in order to obtain a much larger dataset than theirs, following closely the guidelines on data matching suggested by Ridder and Moffitt (2007). As a result, we do not limit ourselves to the analysis of home owners only, and we use a richer set of variables. Finally, our analysis includes the year 2004, while Bostic et al. (2009) have data up to 2001 only.

In our analysis we differentiate between financial and tangible wealth, the latter further disaggregated into the value of the house of residence and the other real estate properties; in addition, we investigate the role of debt on consumption decisions by studying both gross and net wealth. Furthermore, we use information on past capital gains to investigate their direct role on consumption, as suggested by Juster et al. (2005). This direct investigation of the effects of capital gains on consumption has been used in early studies (Bhatia, 1972, Peek, 1983), while more recent work has focused on wealth-based models. We have chosen to perform both, even if the results of the capital gains specification are more prone to suffer from measurement errors, since they are reported (in the SCF) with a lower precision with respect to the wealth stock variables.

The main result of our study is that tangible wealth is the only type of household wealth to significantly and positively affect consumption. In particular, the house of residence is the part of tangible wealth which is responsible for the highest direct wealth effect. However, the estimated elasticity of consumption spending with respect to tangible wealth is low, of the order of .02. These results demonstrate that the fears of sizable reverse direct wealth effects due to a sudden declines in housing values could have been overstated in previous studies (one exception being Case and Quigley, 2008). Indeed, the dynamics of the recent economic and financial crises do not reveal any direct linkage between the declining housing prices and household consumption, rather they shed light on the perverse mechanisms of the real estate and credit (mortgages in particular) markets.

Among the additional results, older households experience a higher wealth effect (that is, extract more liquidity from their assets, as predicted by theory), while they have lower elasticity of consumption with respect to income. The estimation by income quartiles shows that richer households have a higher current income elasticity; also, their consumption paths do not take into high consideration the value of their assets, since the estimated wealth effect for these households are lower than for the poorer ones, and they are often not statistically different from zero.

The rest of this paper is organized as follows. Section 2 provides a review of the previous literature. Section 3 describes the data used and how they were combined. Also, the econometric models are presented. Section 4 illustrates the results. Section 5 concludes briefly.

2. The ‘wealth effect’ in the literature

There is a large literature about the wealth effect, and most of it is based on the life-cycle model originally proposed by Ando and Modigliani (1963). According to this theory, an increase in wealth leads the individuals to gradually increase consumption, thus lowering their savings. Also, the propensity to consume out of wealth, whatever its form, should be the same small number (Paiella, 2007b). In practice, this is likely to be violated, “if assets are not fungible and households develop ’mental accounts’ that dictate that certain assets are more appropriate to use for current expenditure and others for long-term saving” (Paiella, 2007b, 191). Additionally, Lettau and Ludvigson (2004) stress that wealth shocks must be perceived as permanent in order to affect consumption. As a result, the appraisal of the wealth effect is something that must be quantified empirically, and it has been done in a fair number of articles that make use of either household-level or aggregate data. Consequently, a wide range of estimates have been produced. For the U.S economy, they usually lie between 2 and 7 cents of additional consumption per year per 1 dollar increase in household net wealth. This is consistent with the magnitude of the effect estimated by the research staff of the Board of Governors of the Federal Reserve System, that maintains the longest and most regularly updated wealth effect estimates for the USA.

In the latest studies, different results have been found according to the type of household wealth analyzed, mainly dividing between house equity and financial wealth. The reason lies in the fact that households may perceive these two kinds of wealth differently under several perspectives, and this may influence the way it affects consumption (see Case et al., 2005, for an excellent discussion). The empirical evidence seems to confirm this intuition, and even go beyond that. For example, Edison and Sløk (2002) further differentiate financial wealth between technology and non-technology segments of the stock market, finding differences in the wealth effect channel for the USA. Case et al. (2005) study both the financial and the housing wealth effect for the US, finding a significant effect for the latter only. Bostic et al. (2009), in the article which is most closely related to our paper, disaggregate household wealth in financial, house of residence and other real estate, finding different results accordingly. Other authors concentrate either on the first or the second component: to name a few, Belski and Prakken (2004) and Carroll et al. (2006) study the housing wealth effect, while Davis and Palumbo (2001) concentrate on the financial wealth effect.[1]

The empirical appraisal of the wealth effect poses some problems, such as endogeneity and the issue of omitted variables. Endogeneity is present in this kind of analysis, since the value of

[1] See Paiella (2007a) for an excellent survey on the empirical evidence on wealth effects.

household wealth is the result of both past savings and movements of the asset prices. In this respect, a common weakness of the articles that investigate the wealth effect is that they use either aggregate data or non accurate household-level data. In both cases the analysis lack proper instruments to deal with endogeneity. In the first case there are some well known problems, such as aggregation issues and difficulties in decomposing age, cohort and time effects, as it is well explained by Attanasio and Banks (2001). About the second case, even if there are many sources of household-level data for the USA, each one of them, taken singularly, has some drawbacks for the type of analysis that is considered here. The Panel Study of Income Dynamics, (PSID, used for example by Lehnert, 2004, Juster et al, 2005), contains data on food consumption only, and data on household wealth have been collected since 1984 every five year only. The CES (used by Dynan and Maki, 2001, to name one) has very detailed consumption data, but the quality of its wealth data is low. On the other hand, the SCF does not contain detailed consumption variables, while information on wealth is collected very accurately.

In order to overcome these well-known problems of the literature, the strategy of this paper is to build a new household-level dataset combining CES and SCF data. We use a sample combination procedure (explained in the next section) as a way to impute missing values of a variable which we judge to be important in our analysis: specifically, we use it to impute the wealth values to the CES individuals for which we already have detailed consumption data. Thus, we are able to use a very large amount of information, dealing with the problem of omitted variables and therefore moderating the issue of endogeneity. Methods of integrating different sources of information similar to the one that we utilized here, have been recently used by some national institutes of statistics as a convenient way to obtain detailed datasets without having to bear the costs of producing brand new surveys (for instance, see Rosati, 1998, D'Orazio et al., 2006, Del Boca et al., 2005).

3. Data and model

3.1 CES and SCF data

In our analysis we used the wealth data from the SCF to enrich the information contained on the CES, that already contains detailed consumption data, for the period 1989-2004.[2] Then, we exploited this "augmented" CES to perform the econometric analysis on the wealth effect, since this new dataset is perfectly appropriate to shed light on the effects of household wealth on consumption.

[2] The CES contains both the Diary Survey and the quarterly Interview Survey. We used the latter.

The CES is collected by the Bureau of Labor Statistics (BLS) to compute the Consumer Price Index, and contains data on up to 95 percent of total household expenditures. It is a rotating panel in which each household is interviewed four consecutive times over a one year period. Each quarter 25% of the sample are replaced by new households. The survey contains quarterly data, thus we had to extrapolate data on yearly consumption. Moreover, the interviews are conducted monthly about the expenditures of the previous three months: for example, a unit interviewed in January will appear in the same quarter of a unit interviewed in February or March, even if the reported information will cover a slightly different period of time. This overlapping structure of the sample complicates the operation of estimating annual consumption in many dimensions. First, the year over which we have information for each household is different depending on the month in which the household completes its cycle of interviews. Second, and even more important, not all households complete the cycle of four interviews, thus they don't report all the expenditures made in one year.

In order not to waste a vast amount of information, we have chosen to use the data of the households present for the whole year of reference, as well as the data of the households that were interviewed three periods or less, using the following procedure. First, we harmonized the expenditure variables using the Consumer Price Index, differentiated for food, energy and the other goods, in order to have all expenditures expressed with the prices of June of the reference year. Second, we deseasonalized the quarterly measures of consumption using the ratio to moving average method. Finally, we used a simple technique to extend these corrected quarterly expenditures to the whole year of interest: we multiplied by four the expenditure of the households present for one quarter only, by two the expenditure of two quarters and by four thirds the expenditure of the households interviewed for three quarters. For the households that were present for four quarters in a row, we just had to compute the sum across quarters. Thanks to this procedure, we were able to obtain a dataset with more than 17,000 households for the year 2004. We checked whether this operation led to a dataset differing from the original (quarterly) one in terms of distributions of the variables that we used in our analysis, finding no significant difference. For each household, in addition to the expenditure variables, both for durable and for non-durable goods, we kept socio-demographic variables and annual income.[3]

The household wealth data that we imputed to the CES households come from the SCF, which is triennial and is produced by the Federal Reserve Board. This survey also includes socio-

[3] We had to decide about whether and when to drop households for which socio-demographic variables changed from one quarter to another. For example, we dropped the households for which the marital status changed, since we wanted to get rid from the effects of weddings and divorces. In cases of less dramatic changes, we have been more parsimonious. For example, when the educational status changed from one quarter to another, we kept the household and used the educational status of the quarter closer to the central quarter of the year.

demographic information that proved valuable for the statistical matching procedure, as well as for the estimation of the consumption models. In particular, we used data on marital status, race, age, education and occupation of the household head, home ownership status and family size. The period covered by the analysis starts in 1989, mainly because the SCF question frame was different in earlier periods, and ends in 2004, with 6 observations in total. Moreover, we used the information contained in all the five implications of the SCF (implications that derive from the multiple imputation procedure used to approximate the distribution of missing data, as explained in Kennickell, 1998), by performing the sample combination with the CES separately for each implication. To correctly take into account multiple imputation, the estimation of the consumption models were then carried out using Repeated Imputation Inference (RII), as explained by Montalto and Sung (1996).

3.2 The matching procedure

The aim of the procedure is to look for similar households across the two surveys and then to attach the wealth variables observed for the SCF households to the most similar ones in the CES, so to get an "augmented" CES that contains detailed information on wealth in addition to the consumption and socio-demographic variables originally collected by the BLS. In constructing and applying the matching procedure we followed several principles and suggestions given by Ridder and Moffitt (2007) so to make sure to produce a high quality new dataset. The details of the procedure are the following.

We first partitioned both samples into cells based on six categorical variables in order to avoid to match individuals that differ in important characteristics. For the year 2004, and similarly for the other years, more than 700 cells were created using:

* Race - white, black or other;
* Marital status - married or not;
* Education - twelfth grade or less, high school, some college or more;
* Tenure - home owner or not;
* Occupation - not working, managers and professionals, technicians, services, operators, other;
* Family size - one, two, three or four or more people in the household.

Thanks to this highly detailed partition that took into account many different variables, we were able to avoid the risk of matching pairs of households differing in fundamental characteristics. Almost every cell contained individuals from both surveys, and the imputation of the wealth variables to the CES households has been done only using SCF households pertaining to the same cell. Thus, within every cell, we looked for the most similar individuals across the two surveys

according to the values of income and age, building a unique distance function able to measure the differences in this two variables.[4] In this way, we were able to select the pairs of households coming from the two different surveys in which the SCF household wealth values were assigned to the CES household. We also refined the matching by dropping the individuals for which the distance function displayed too high value, that is, the matched individuals had non-deniable differences in age and/or income to be paired together.[5] The matching process yielded a dataset with more than 14000 observations in 2004.[6]

We checked the result of the matching procedure in two different ways. We verified the similarity among the correlations between income (which is observed in both surveys) and the wealth variables both in the SCF and in our augmented CES (after-matching). Table 1 shows that the similarity is very high, suggesting the fact that the procedure did not change the distribution of the imputed variables, a signal of good quality of the overall sample combination. Furthermore, we produced the graphs of the probability density functions of the matched variables obtained with a kernel density estimation, finding comfortingly similar curves. Figures 1-6 report the graphs for household net wealth: we have chosen to report this variable because it comprehends both assets and debt, therefore it summarizes more than other variables the results of the matching procedure. Although the two distributions do not completely overlap because not all the SCF individuals are used as donors in the matching procedure, the curves do show very similar patterns, again making sure that the matching procedure maintained the distributional properties of the variables of interest.

We used these precautions because sample combination methods must be applied with some care, as there are some conditions that have to be met in order not to commit errors. First, the two different surveys must be two samples drawn from the same population (Ridder and Moffitt, 2007). Second, there must be a set of common variables on which to condition the matching procedure, as it is clear from the above description of the procedure. In our case, the first condition seems easy to be met, since CES and SCF should both represent the US population. However, their sample designs are different, since the SCF oversamples households that are likely to be wealthier, while

[4] We did it performing a bivariate (income and age) propensity score matching based on Mahalanobis distance.

[5] In particular, we dropped the households that fell into the top 15% of the distribution of the distance variable. We also had to build a different distance function for the groups with one or two individuals only from either one or the other survey, using the normalized logarithmic income and age, and we dropped the top 20% of households matched according to this second, and rougher, algorithm (because with few households in a cell, there was a higher probability to match pairs of households that differ significantly in their values of income and age).

[6] In order to perform a very precise matching, we deliberately decided to treat age as a non-categorical variable (building 5 or 10 year groups, as it has been done in some previous works), something that would have left income as the only variable to be used in the within-cell matching. In particular, suppose we used 10 year age groups, dividing between individuals that are 21-30 years old, 31-40 years old and so on. In this case it would have been possible to match a 30 years old household with a 21 years old control, even if a 31 years old control (with equal income) would have been a better choice. By using age together with income for the propensity score matching, we avoid such possibility and we minimize the distance between potential controls of the SCF and "treated" individuals of the CES (treated in the sense that we imputed to them the wealth variables).

the CES does not. This leads to differences in the distributions of the variables of interest (*in primis,* income). Consequently we had to get rid of the wealthiest households present in the SCF in order to get comparable income distributions between the two surveys (in particular, we dropped a percentage between 20 and 30% of the sample households with the highest income depending on the year of reference).[7] About the second condition, there are many socio-demographic variables that are collected in both surveys, and the only problem here is to recode the variables in order to have them measured in the same scale. This has been carried out making a large use of the documentation that accompanies the public releases of the two surveys. The majority of these operations of recoding were elementary. The most interesting exception has been the recoding of the occupational sector variable for the 1989 and 1992 waves of the CES, where there is an additional category, "self-employed", that in the SCF is not taken into account. In this case we performed a multinomial logit estimation to impute the occupational sector to the CES individuals labeled as "self-employed" in order to proceed with the matching with the SCF. The estimation results were in line with the distributions of the occupational variable both in the SCF and in the subsequent editions of the CES.

3.3 The model

Following the literature on life cycle consumption, the basic specification of our model is the following:

$$\log(C) = \beta_1 \log(Y) + \beta_2 \log(fin) + \beta_3 \log(nfin) + \alpha' Z + \varepsilon \qquad (1)$$

where C is total consumption, Y is current income, *fin* is gross financial assets, and *nfin* is tangible assets. Z is a vector of additional socio-demographic controls: age, educational level, a dummy for the marital status (married or with a partner/single), two dummies for the race (one for African Americans, the other for non-Whites) and a dummy for the occupational status (working/not working) of the household head; the number of persons in the household; a dummy for the homeownership status; and three different dummies for the US geographical area (Northeast, Midwest and South, with West being the reference region). While the regional dummies are supposed to capture macroeconomic factors, the other variables capture life cycle effects that are likely to affect consumption. In our analysis we used a number of different specifications, in order

[7] However, we also performed the matching procedure without this preliminary operation and the resulting dataset did not differ dramatically from the one that we used. This is not surprising, because the Mahalanobis procedure discards the SCF households that differ considerably from the CES households in terms of income (and age), so that most of the preliminarily dropped SCF individuals would have been discarded anyway by the matching algorithm.

to investigate the role of the different components of household wealth (equation (2)), the importance of net compared to gross wealth (equation (3)), the effects on durables and non-durables consumption only, the effects of capital gains instead of the stocks of wealth (equation (4)). The specifications are the following:

$$\log(C) = \beta_1 \log(Y) + \beta_2 \log(\,fin) + \beta_3 \log(house) + \beta_4 \log(ore) + \alpha' Z + \varepsilon \qquad (2)$$

where tangible assets are disaggregated into *house*, the value of the house of residence, if owned, and *ore*, the value of other real estate properties.

$$\log(C) = \beta_1 \log(Y) + \beta_2 \log(netfin) + \beta_3 \log(house) + \beta_4 \log(ore) + \alpha' Z + \varepsilon \qquad (3)$$

where *netfin* is financial assets diminished by household debt.

$$\log(C) = \beta_1 \log(Y) + \beta_2 \log(kgbus) + \beta_3 \log(kgstmf\,) + \beta_4 \log(kghouse) + \beta_5 \log(kgore) + \alpha' Z + \varepsilon \qquad (4)$$

where *kgbus* is capital gains on business activities, *kgstmf* on stocks and mutual funds, *kghouse* on the house of residence and *kgore* on other real estate properties.

These four equations were also estimated with two alternative dependent variables, the logarithm of consumption of durable and non-durable goods, the latter being more relevant and, also, more closely related to most of the previous literature. The use of expenditure on durable goods poses some problems, since its timing does not match the flow of services coming from the goods. The relationship between consumption, income and wealth applies to the flow of consumption, but durable good expenditure "represents replacements and additions to a stock, rather than the service flow from the existing stock" (Paiella 2007b, 198). This is why we will mainly concentrate on the results for total and, above all, non durable goods consumption.[8]

The models described by the above equations were estimated cross-sectionally using data on 1989, 1992, 1995, 1998, 2001 and 2004. In the second part of the analysis we also estimated a model by pooling data over the six surveys, adding year dummies. In all the specifications we also added a few interaction variables in order to better grasp the wealth and consumption dynamics of the old

[8] Additionally, the issue of endogeneity is likely to heavily affect the results in the case of durable goods expenditure, more than when non-durable goods expenditure is used as the dependent variable. Suppose a household buys a car in 2004: we will observe an increase both in tangible wealth and in durables consumption, a fact that will pose some problems in the estimation of the wealth effect (spurious relationship). Using non-durables consumption as the dependent variable mitigates this problem.

people. In particular, a dummy that takes the value of 1 if the household head is over 65 years old is multiplied by income and all the wealth variables. Again, the regressions were run with the three alternative dependent variables described above.

4. Results

The results from the cross-sectional estimation of equations (1-4) are reported in Tables 2-5. For reasons of expositional clarity, only the coefficients of the main variables of interest are reported (complete results are available on request). All the estimations take into account the multiple imputation used in the SCF using the RII (see Montalto and Sung, 1996). Very briefly, the SCF (and consequently, our augmented CES) consists of five complete data sets because missing data are multiply imputed. Thanks to the RII, we use information from all five data sets in order to make valid inferences, taking into account the extra variability in the data due to imputation.

The results of the estimation of equation (1) are reported in tables 2a, 2b and 2c (as three different dependent variables are used). Current income significantly affected consumption in the period 1989-2004, since its coefficient is always highly significant and the estimated elasticity ranges between 0.3 and 0.5, indicating that current income plays a very important role in determining current consumption. Turning to the household wealth coefficients, an interesting result is that the different components do have different effects on consumption. In particular, financial wealth positively affected consumption (both total and non-durable) during the Nineties only, while it shows non-significant coefficients for the rest of the sample period. Probably, the model captured the effects of the stock market boom that ended in 2001. However, when significantly different from zero, the estimated elasticity of consumption to financial wealth is very low, being it close to .01. This means that only a one cent increase in consumption is associated to a one dollar increase in financial wealth, well below most of the previous estimates that found significant effects of this kind of wealth on consumption.

On the contrary, tangible wealth positively affects consumption throughout the whole period of interest, even if the estimated elasticity is, again, very low (close to .01). However, we investigate better the effects of tangible wealth in the following specifications, where we disaggregate it and where we also take into account debt considerations. As a final consideration on the estimation of equation (1), the surprising coefficients associated with the wealth variables in Table 2c confirm the warning raised by Paiella (2007b): it is problematic to use durable goods expenditure as the dependent variable in this kind of analysis. Therefore, we disregard the results with this dependent variable in the rest of the discussion. However, due to the importance of the durables part of

household consumption (see Romer, 1990), throughout the whole paper we use both total consumption and non-durables consumption as dependent variables, to check if the results hold for the "most proper" measure of consumption (non-durables) as well as for the most comprehensive measure (total consumption).

Tables 3a and 3b show the results of the estimation of equation (2), when tangible wealth is disaggregated into the value of the house of residence and the value of other real estate. While the results confirm the previous findings on financial wealth, they show that there are significant differences in the way in which the value of the house of residence affects consumption, as opposed to the rest of household's tangible properties. The estimated elasticity for the value of the house of residence is from three to five times larger than the one of the other real estate. Moreover, while the latter has comparable values across the whole sample period, the estimated elasticity for the house of residence is considerably larger for the last two periods, 2001 and 2004. As in the case of the financial wealth coefficients of the Nineties, this does not come as a complete surprise, because of the well known housing prices bubble that started in 2000 and abruptly ended with the start of the recent financial crisis, in the second half of 2007. The estimated wealth effect of the house of residence in 2004 is .03, a value that still lies in the low range of the previous literature estimates.

Tables 4a and 4b introduce debt considerations in the analysis, because net financial wealth is considered instead of gross financial assets (equation (3)). The results confirm the above findings for tangible wealth, while the results for the financial wealth effects are less clear-cut. The estimated coefficients for this variable remain close to zero, but they are statistically significant in different periods depending on the dependent variable used: there is a significant effect in the first two periods when considering total consumption, but in the last two when considering non-durables consumption. However, since the estimated elasticity is in all cases very low, we see this results as a confirmation of the negligible role of financial wealth in determining consumption patterns.

Tables 5a and 5b show the results of the estimation of equation (4), with capital gains as the wealth variables of interest. As anticipated above, we did not expect to find important results from this estimation, since capital gains variables are more prone than the wealth variables to severe measurement errors that can compromise the estimation of the model. Indeed, this is confirmed by the estimated coefficients. For all the four different types of capital gains, the associated coefficients are always close to zero, and most of the time they are not statistically significant at standard levels.

We now turn to the estimation of the pooled cross sections, shown in Tables 6 (equation (2)) and 7 (for the model of equation (3)).[9] The results confirm the findings of the cross-sectional estimates,

[9] We thought about adopting pseudo-panel techniques *à la* Deaton (1985), but due to the construction of our dataset with a statistical matching procedure, we found it difficult to apply additional methods to manipulate the data and introduce additional assumptions.

with the bigger importance of tangible wealth with respect to financial wealth, and the higher elasticity coming from the value of the house of residence with respect to the rest of the tangible assets. The year dummies presents highly significant coefficients, confirming that consumption patterns are sensitive to macroeconomic conditions.

It is interesting to spend a few words on the results for the other explanatory variables of the model. Most of them have significant coefficients throughout all the specifications. This is not surprising, since a satisfactory R squared is reached in all estimations. Some results are particularly interesting and confirm previous literature findings. For instance, the coefficients of the dummies that indicate that the household head belongs to an ethnic minority (either Afro-American or a different one) are always negative and economically important. A similar effect is also found for the dummy that indicates that the household lives in a rented house. The results conform to the previous literature also when they show that higher education is associated to higher consumption. The non trivial relationship between age and consumption is confirmed by the high statistical significance of the coefficients of age and age squared (the first positive, the second lower and negative). Finally, the regional dummies are often associated to significant and negative coefficients, a fact that must be read bearing in mind the region of reference (that is, whose dummy is not included) is West. Another interesting fact is the coefficient associated to the dummy that indicates that the household head does not work, which shows that such a condition is associated with a lower consumption, even controlling for income. The behaviour of the older households is investigated through the utilization of the interaction terms between the “old” dummy and the income and wealth variables. The estimations show that old people experience a higher wealth effect from the value of the house of residence, while they have a lower income elasticity.

We deepen the pooled cross-sections analysis by performing an estimation dividing the sample by income quartiles, to better understand the effects of distribution on the variables investigated. Table 8 presents the coefficients of the income and wealth variables for the estimation of equation (2), dividing the pooled cross-sections sample by income quartiles. The results are interesting: the consumption elasticity to income rises as we go from the lowest to the highest income quartile. At the same time, the importance of wealth in affecting the consumption patterns decreases. This suggests that variations of the value of the assets matter for consumption only when income is low, while when it is high, its effects dominate the ones of wealth.

We investigated the robustness of our findings in a few ways. The results hold when we restrict our sample to urban households only (they are almost 90% of the sample). The same is true when we get rid of the 1% of household that are at the top and at the bottom both of the income and of the consumption distributions. As said previously, the results are also robust to variations of the sample

combining procedure. This robustness is not surprising, since our sample is very large, and it is unlikely that our results are driven by outliers or by small subsamples of households.

5. Conclusions

This paper analyses the strength of the wealth effect on consumption in the USA with a dataset specifically built for this scope. We combine data from the CES and the SCF for the years 1989-2004. In particular, the SCF was used as the "donor" survey: its wealth data were given to CES households in order to enrich the data collected in this latter survey and to perform an analysis capable to link consumption and wealth using household-level data. This sample combination produced a large dataset capable to respect the properties of the distributions of the variables of interest present in each of the two original survey. The resulting dataset was then used to estimate four different specifications of a simple consumption model. The effects of wealth were investigated using three different dependent variables: total, durables and non durables consumption. However, the latter is the most correct measure of consumption to be used in this kind of analysis, as widely discussed previously. Also, our dataset permits a high disaggregation of tangible wealth, as well as a differentiation between net and gross financial wealth. Two kinds of estimations are performed. First, the models were estimated for each cross-section; then, a final estimation was carried out on the pooled cross-sections. In all the specifications, a few interaction terms were used to better grasp the consumption dynamics of the older households. The results show that tangible wealth positively affected consumption of US households in the period 1989-2004. The estimated elasticity (.02) lies in the low range of what constitutes the consensus on how asset market gains affect consumer spending in the USA. It seems that households tend to consume both out of their house of residence and out of their other real estate properties, even if the former is more important of the latter. On the other hand, the results suggest that financial wealth does not exert any direct effect on household consumption. This piece of evidence adds to the mixed results of the previous literature, where the widest range of results has been found for this kind of wealth. These results are confirmed both by the cross-sectional estimates and by the estimation of the pooled cross-sections. Additional interesting results come from the estimation by income quartiles, that shows that the consumption elasticity to income rises as we go from the lowest to the highest income quartiles; at the same time, the importance of the wealth effect decreases. About the older households, it seems that the wealth effect out of the house of residence is higher for them, while their income elasticity is lower. Overall, our results demonstrate that the fears of sizable reverse direct wealth effects due to a sudden decline in housing values has been overstated in previous

studies. In fact, the dynamics of the recent economic and financial crises do not reveal any direct linkage between the declining housing prices and household consumption, rather they shed light on the perverse mechanisms of the real estate and credit (mortgages in particular) markets. Then, since wealth seems to play a negligible role in determining the consumption dynamics of the households, some other considerations must be at the roots of the impressive decline of saving rates observed in the USA, and in other developed countries as well, in the last twenty years. Policy makers should concentrate on these other determinants if willing to manipulate the consumption and saving patterns of the economy.

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Figures

Figure 1: Household net wealth kernel distribution, 2004

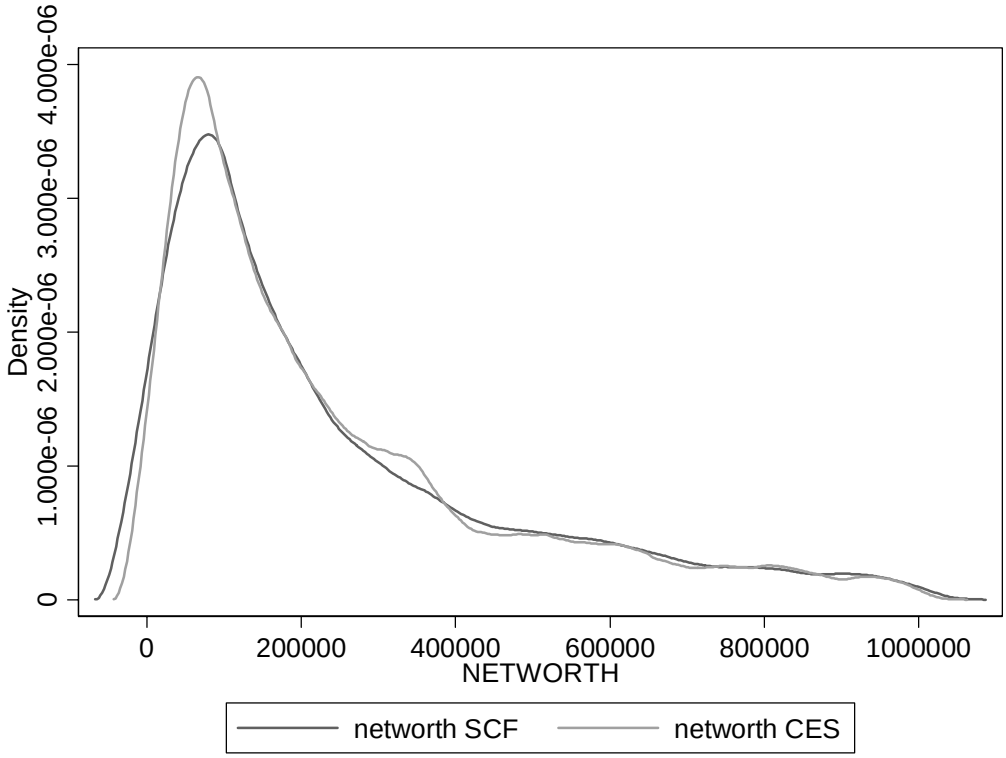


Figure 2: Household net wealth kernel distribution, 2001

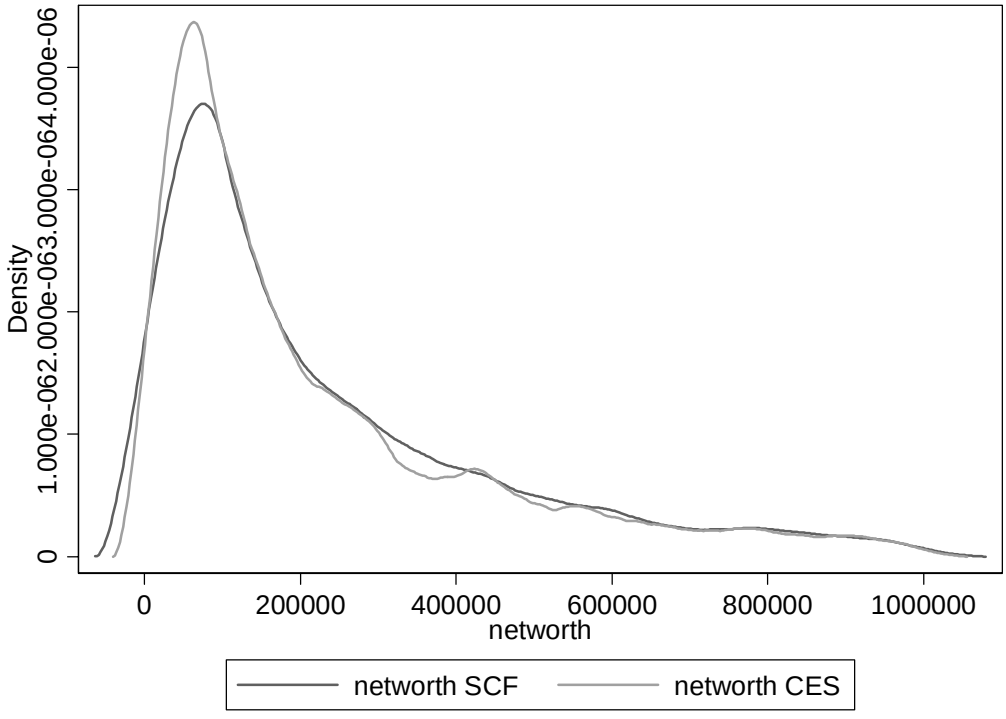


Figure 3: Household net wealth kernel distribution, 1998

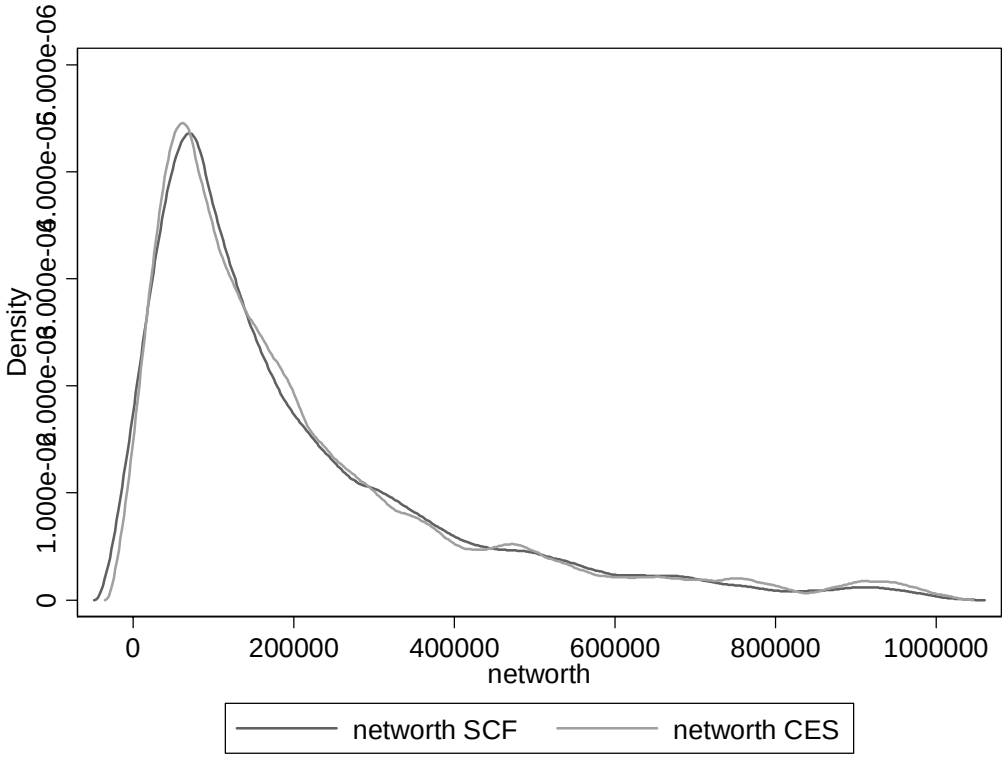


Figure 4: Household net wealth kernel distribution, 1995

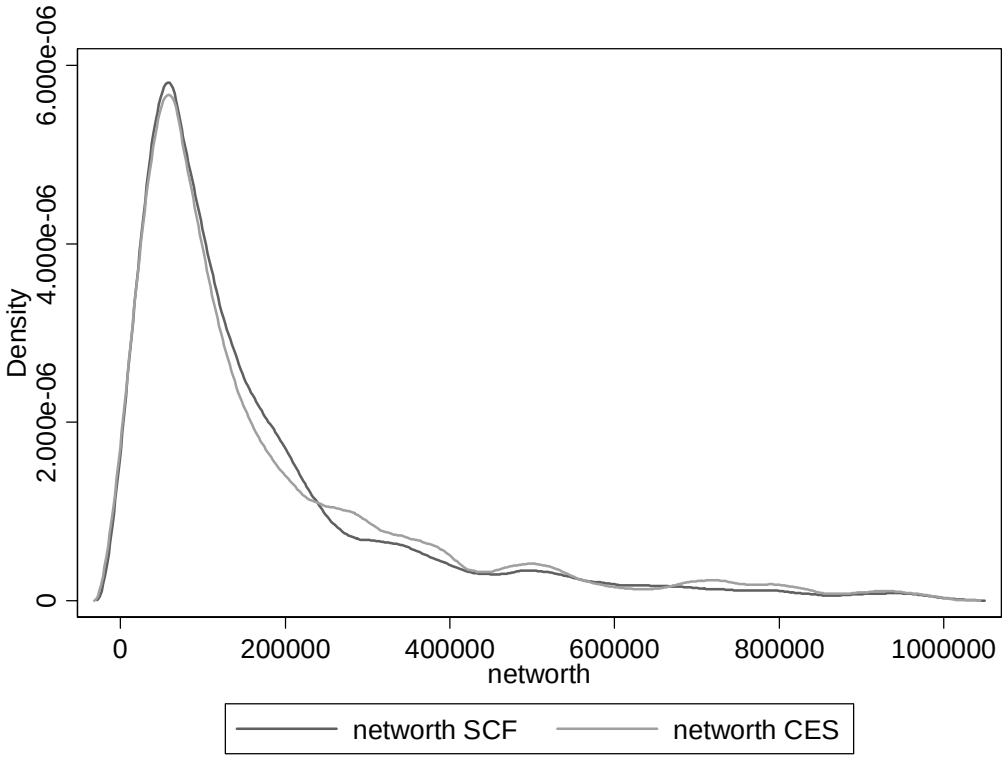


Figure 5: Household net wealth kernel distribution, 1992

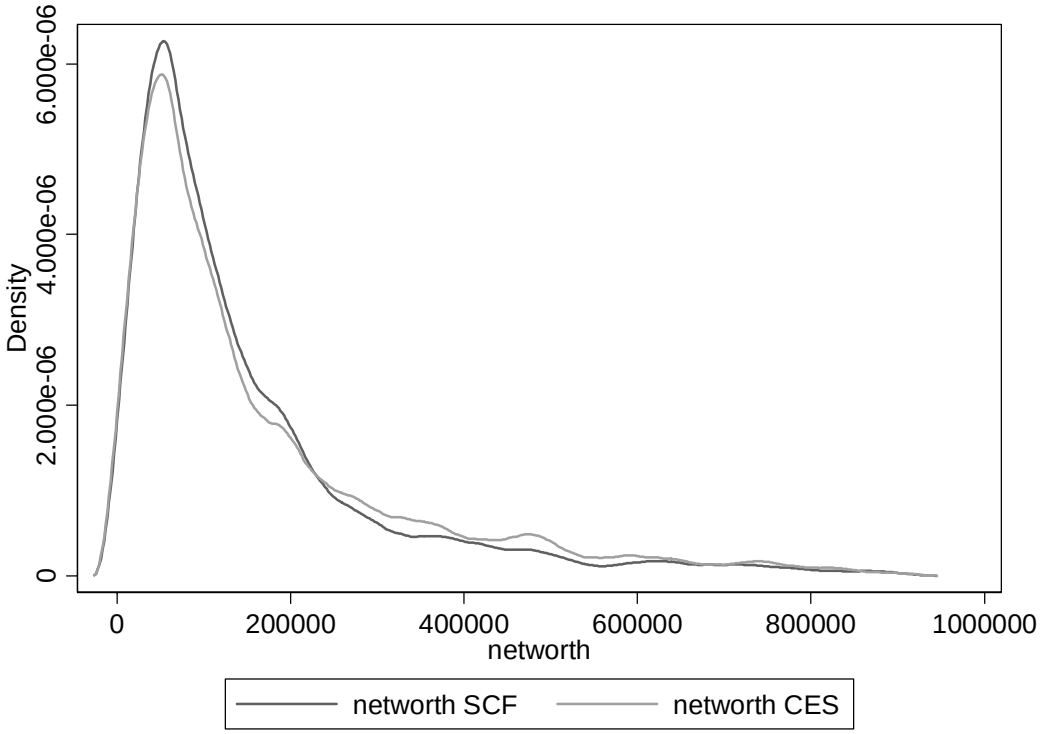
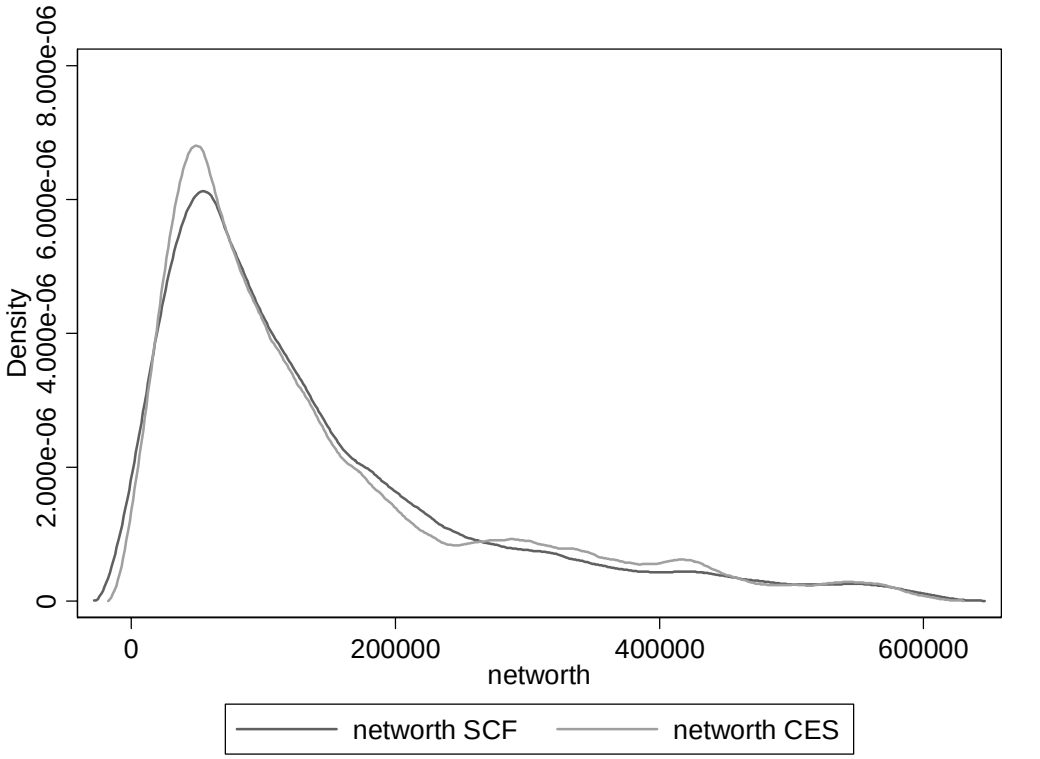


Figure 6: Household net wealth kernel distribution, 1989



Tables

Table 1: correlations between logarithmic income and the wealth (SCF) variables

	2004		2001		1998	
	SCF	CES	SCF	CES	SCF	CES
fin	0.26***	0.18***	0.27***	0.14***	0.22***	0.11**
nfin	0.25***	0.26***	0.24***	0.18***	0.19***	0.17***
asset	0.30***	0.26***	0.31***	0.20***	0.25***	0.17***
debt	0.41***	0.40***	0.47***	0.42***	0.38***	0.29***
networth	0.28***	0.23***	0.29***	0.18***	0.23***	0.16***
kgtotal	0.18***	0.15***	0.18***	0.09**	0.13***	0.12**
	1995		1992		1989	
	SCF	CES	SCF	CES	SCF	CES
fin	0.18***	0.12**	0.24***	0.19***	0.25***	0.08***
nfin	0.20***	0.09**	0.16***	0.09***	0.21***	0.10***
asset	0.24***	0.12***	0.21***	0.11***	0.27***	0.13***
debt	0.32***	0.29***	0.28***	0.14	0.39***	0.33***
networth	0.22***	0.10***	0.19***	0.10***	0.25***	0.12***
kgtotal	0.14***	0.04**	0.12***	0.07***	0.15***	0.06***

*, **, *** significant at 10, 5 and 1% respectively.

Table 2: equation (1), three different dependent variables

2a. Dependent variable: Total consumption						
	1989	1992	1995	1998	2001	2004
Income	0.439***	0.392***	0.354***	0.382***	0.404***	0.535***
Fin. assets	0.002	0.000	0.006*	0.006**	0.004	-0.001
Non fin. assets	0.007**	0.010***	0.009**	0.004*	0.006**	0.004
Old*Income	0.058**	0.001	0.114***	0.067***	0.039**	0.009
Old*Fin. assets	-0.001	0.001	0.010*	-0.001	-0.001	0.005
Old* Non fin. assets	0.000	-0.011**	0.007	0.008*	0.006	-0.008*
Obs.	7344	7638	7159	9870	12178	14411
R-squared	0.67	0.66	0.63	0.60	0.60	0.63

2b. Dependent variable: Durables consumption						
	1989	1992	1995	1998	2001	2004
Income	0.532***	0.503***	0.399***	0.456***	0.461***	0.657***
Fin. assets	0.000	-0.017**	0.004	-0.003	-0.003	-0.008**
Non fin. assets	0.008	0.019***	0.020***	0.015***	0.014***	0.010*
Old*Income	0.145***	0.091**	0.217***	0.139***	0.098***	0.098***
Old*Fin. assets	0.025	0.022*	0.022**	0.020*	0.020*	0.019**
Old* Non fin. assets	-0.063***	-0.056***	-0.034***	-0.031***	-0.035***	-0.047***
Obs.	7344	7638	7159	9870	12178	14411
R-squared	0.43	0.44	0.41	0.39	0.39	0.41

2c. Dependent variable: Non durables consumption						
	1989	1992	1995	1998	2001	2004
Income	0.405***	0.371***	0.346***	0.378***	0.400***	0.522***
Fin. assets	0.003	0.007**	0.007**	0.005**	0.007***	0.002
Non fin. assets	0.007**	0.004	0.007*	0.002	0.002	0.004
Old*Income	0.009	-0.022	0.088***	0.050**	0.019	-0.019
Old*Fin. assets	-0.011	-0.005	0.005	-0.004	-0.009*	-0.005
Old* Non fin. assets	0.014**	0.011**	0.022***	0.023***	0.024***	0.016***
Obs.	7344	7638	7159	9870	12178	14411
R-squared	0.68	0.66	0.65	0.63	0.63	0.63

Note: All the estimations were carried out using the Repeated Imputation Inference (RII). *, **, *** significant at 10, 5 and 1% respectively.

Table 3: equation (2), two different dependent variables

3a. Dependent variable: Total consumption						
	1989	1992	1995	1998	2001	2004
Income	0.429***	0.391***	0.320***	0.369***	0.398***	0.528***
Fin. assets	0.003	-0.001	0.007**	0.006**	0.004*	-0.003
Other real estate	0.004	0.007***	0.006**	0.004**	0.003	0.003
House	0.008	0.018***	0.016*	0.009	0.011**	0.027***
Old*Income	0.003	-0.002	-0.003	-0.001	-0.003	0.002
Old*Fin. assets	-0.007	0.002	0.002	-0.004	-0.004	0.005
Old* Other real estate	0.003	-0.005	0.002	0.001	0.007	0.003
Old*House	-0.001	-0.007**	-0.001	0.003	0.000	-0.008***
Obs.	7344	7638	7159	9870	12178	14411
R-squared	0.67	0.66	0.63	0.60	0.60	0.63
3b. Dependent variable: Non durables consumption						
	1989	1992	1995	1998	2001	2004
Income	0.400***	0.370***	0.316***	0.366***	0.393***	0.517***
Fin. assets	0.003	0.006**	0.008***	0.005**	0.007***	0.001
Other real estate	0.004	0.006**	0.007**	0.004**	0.002	0.004
House	0.012**	0.014**	0.016*	0.014**	0.014***	0.027***
Old*Income	-0.005	-0.015**	-0.014**	-0.012*	-0.010*	-0.007
Old*Fin. assets	-0.015**	-0.005	-0.003	-0.010*	-0.012**	-0.008*
Old* Other real estate	0.000	-0.008*	-0.001	0.001	0.006	0.002
Old*House	0.016***	0.017***	0.018***	0.020***	0.017***	0.014***
Obs.	7344	7638	7159	9870	12178	14411
R-squared	0.68	0.67	0.65	0.63	0.63	0.63

Note: All the estimations were carried out using the Repeated Imputation Inference (RII). *, **, *** significant at 10, 5 and 1% respectively.

Table 4: equation (3), two different dependent variables

4a. Dependent variable: Total consumption						
	1989	1992	1995	1998	2001	2004
Income	0.433***	0.392***	0.325***	0.373***	0.400***	0.524***
Net fin. assets	-0.000	-0.000	0.001	0.001	0.001	0.001*
Other real estate	0.004*	0.006***	0.007***	0.005***	0.004*	0.003
House	0.008	0.018***	0.018***	0.011	0.012**	0.026***
Old*Income	-0.000	-0.001	-0.003	-0.003	-0.005	0.006
Old*Net fin. assets	-0.003	-0.002	0.002	-0.001	-0.001	-0.000
Old* Other real estate	0.002	-0.004	0.003	-0.000	0.006	0.004
Old*House	-0.001	-0.006**	-0.001	0.002	-0.001	-0.007***
Obs.	7344	7638	7159	9870	12178	14411
R-squared	0.67	0.66	0.63	0.60	0.60	0.63
4b. Dependent variable: Non durables consumption						
	1989	1992	1995	1998	2001	2004
Income	0.404***	0.375***	0.320***	0.368***	0.396***	0.514***
Net fin. assets	0.000	0.001	0.001	0.001**	0.002***	0.002***
Other real estate	0.005**	0.008***	0.008***	0.005**	0.004*	0.004*
House	0.013**	0.016***	0.019**	0.015**	0.016***	0.027***
Old*Income	-0.013**	-0.016***	-0.015**	-0.017***	-0.016***	-0.010**
Old*Net fin. assets	-0.005**	-0.003	0.000	-0.003	-0.002	-0.002
Old* Other real estate	-0.002	-0.009**	-0.002	-0.001	0.003	0.001
Old*House	0.014***	0.016***	0.017***	0.018***	0.015***	0.011***
Obs.	7344	7638	7159	9870	12178	14411
R-squared	0.68	0.67	0.65	0.63	0.63	0.63

Note: All the estimations were carried out using the Repeated Imputation Inference (RII). *, **, *** significant at 10, 5 and 1% respectively.

Table 5: equation (4), two different dependent variables

5a. Dependent variable: Total consumption						
	1989	1992	1995	1998	2001	2004
Income	0.436***	0.400***	0.330***	0.377***	0.405***	0.535***
Stock mkt c.g.	0.001	0.002	0.006***	0.006***	0.000	0.001
Business c.g.	-0.000	0.001	0.001	0.000	0.002	0.001
House c.g.	0.000	0.002	-0.001	-0.001	0.000	0.003***
Other real est. c.g.	-0.000	0.002	0.001	0.002	0.002	0.002
Old*Income	-0.001	-0.008**	-0.000	-0.001	0.001	0.004
Old*Stock mkt c.g.	-0.006	-0.001	-0.006	-0.010**	-0.003	-0.005
Old*Business c.g.	-0.001	0.002	-0.007	0.001	0.001	0.005
Old*House c.g.	-0.000	-0.003	0.002	0.004	0.000	-0.003
Old*Other real est. c.g.	0.005	-0.007*	0.002	-0.000	-0.005	0.001
Obs.	7344	7638	7159	9870	12178	14411
R-squared	0.67	0.66	0.62	0.60	0.60	0.63
5b. Dependent variable: Non durables consumption						
	1989	1992	1995	1998	2001	2004
Income	0.405***	0.381***	0.321***	0.369***	0.399***	0.525***
Stock mkt c.g.	0.003	0.002	0.006**	0.006***	0.000	0.002*
Business c.g.	-0.001	0.002	0.002	0.002*	0.003**	0.001
House c.g.	0.000	0.002	-0.001	-0.001	0.000	0.002*
Other real est. c.g.	0.001	0.003	0.003*	0.002	0.005***	0.003***
Old*Income	-0.011***	-0.015***	-0.003	-0.005	-0.004	-0.006*
Old*Stock mkt c.g.	-0.009*	-0.001	-0.005	-0.010**	-0.005	-0.002
Old*Business c.g.	0.007	0.002	-0.008	0.001	-0.001	0.005
Old*House c.g.	0.008***	0.006**	0.008***	0.010***	0.008***	0.008***
Old*Other real est. c.g.	0.003	-0.004	0.001	-0.001	-0.005	-0.001
Obs.	7344	7638	7159	9870	12178	14411
R-squared	0.68	0.67	0.65	0.63	0.63	0.63

Note: All the estimations were carried out using the Repeated Imputation Inference (RII). *, **, *** significant at 10, 5 and 1% respectively.

Table 6: equation (2), three different dependent variables – pooled cross sections

	6a. Total cons.	6b. Non-durables cons.	6c. Durables cons.
Income	0.400***	0.389***	0.474***
Fin. Assets	0.003***	0.006***	-0.004*
Other real estate	0.006***	0.005***	0.011***
House	0.019***	0.022***	0.017***
Race-Black	-0.067***	-0.050***	-0.097***
Race-Other	-0.035***	-0.052***	-0.069***
Single	-0.138***	-0.135***	-0.157***
Educated	0.094***	0.091***	0.113***
Age	0.015***	0.012***	0.036***
Age squared	-0.000***	-0.000***	-0.000***
Home Renter	0.081**	0.080***	0.112**
Not working	-0.074***	-0.078***	-0.068***
Family size	0.063***	0.071***	0.057***
North East	-0.025***	0.020***	-0.110***
Midwest	-0.070***	-0.009	-0.165***
South	-0.069***	-0.015**	-0.183***
Year 1989	-0.128***	-0.153***	-0.127***
Year 1992	-0.078***	-0.095***	-0.062***
Year 1995	-0.023***	-0.055***	0.013
Year 1998	-0.058***	-0.094***	-0.037***
Year 2001	0.046***	0.032***	0.073***
Old*Fin. Assets	-0.000	-0.008***	0.018***
Old*Other real estate	0.008***	0.005	0.002
Old*House	0.001	0.019***	-0.043***
Old*Income	-0.004	-0.014***	0.029***
Constant	5.352***	4.912***	3.233***
Obs.	58580	58580	58580
R-squared	0.64	0.66	0.42

Note: All the estimations were carried out using the Repeated Imputation Inference (RII). *, **, *** significant at 10, 5 and 1% respectively.

Table 7: equation (3), three different dependent variables - pooled cross sections

	7a. Total cons.	7b. Non-durables cons.	7c. Durables cons.
Income	0.403***	0.393***	0.473***
Net fin. assets	0.000	0.002***	-0.003**
Other real estate	0.007***	0.006***	0.010***
House	0.021***	0.024***	0.016***
Race-Black	-0.069***	-0.052***	-0.101***
Race-Other	-0.037***	-0.054***	-0.071***
Single	-0.140***	-0.136***	-0.158***
Educated	0.096***	0.093***	0.114***
Age	0.015***	0.012***	0.037***
Age squared	-0.000***	-0.000***	-0.000***
Home Renter	0.089***	0.084***	0.123**
Not working	-0.076***	-0.082***	-0.065***
Family size	0.063***	0.070***	0.057***
North East	-0.025***	0.020***	-0.110***
Midwest	-0.070***	-0.009	-0.165***
South	-0.069***	-0.015**	-0.183***
Year 1989	-0.127***	-0.153***	-0.124***
Year 1992	-0.078***	-0.095***	-0.062***
Year 1995	-0.022***	-0.054***	0.013
Year 1998	-0.056***	-0.092***	-0.037***
Year 2001	0.047***	0.034***	0.074***
Old*Net fin. assets	-0.001	-0.004***	0.005*
Old*Other real estate	0.008***	0.003	0.007
Old*House	0.001	0.016***	-0.036***
Old*Income	-0.004	-0.017***	0.038***
Constant	5.331***	4.897***	3.210***
Obs.	58580	58580	58580
R-squared	0.64	0.66	0.42

Note: All the estimations were carried out using the Repeated Imputation Inference (RII). *, **, *** significant at 10, 5 and 1% respectively.

Table 8: equation (2), pooled OLS by income quartiles

8a. Dependent variable: Total consumption				
	q1	q2	q3	q4
Income	0.175***	0.403***	0.535***	0.629***
Fin. assets	-0.001	0.000	-0.003	0.002
Other real estate	0.010***	0.001	0.000	-0.003
House	0.021**	0.017**	0.010**	0.000
Old*Income	0.005	0.005	0.006	0.005
Old*Fin. assets	0.007*	-0.003	-0.003	-0.006
Old* Other real estate	-0.002	0.008	-0.002	0.024
Old*House	-0.010***	-0.004	-0.006	0.002
8b. Dependent variable: Durables consumption				
	q1	q2	q3	q4
Income	0.316***	0.415***	0.549***	0.585***
Fin. assets	-0.009	-0.000	-0.005	-0.000
Other real estate	0.196***	-0.001	-0.002	-0.006
House	0.027	0.021*	0.014*	0.007
Old*Income	0.027***	0.038***	0.042***	0.021
Old*Fin. assets	0.024***	0.002	-0.002	-0.009
Old* Other real estate	-0.009	0.007	-0.006	0.028
Old*House	-0.052***	-0.039***	-0.038***	-0.015
8c. Dependent variable: Non durables consumption				
	q1	q2	q3	q4
Income	0.139***	0.408***	0.548***	0.659***
Fin. assets	0.002	0.000	-0.002	0.004*
Other real estate	0.009***	0.001	0.002	-0.003
House	0.021**	0.015***	0.010***	-0.003
Old*Income	0.003	-0.010*	-0.012	-0.007
Old*Fin. assets	0.001	-0.007*	-0.005	-0.010
Old* Other real estate	-0.005	0.011	0.001	0.027
Old*House	0.003	0.018***	0.014*	0.017

Note: All the estimations were carried out using the Repeated Imputation Inference (RII). *, **, *** significant at 10, 5 and 1% respectively.